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Growth in the 'Cohesion Countries': the Irish tortoise and the Portuguese hare, 1979-2002*

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ABSTRACT

The deepening of economic and financial integration in the European Union has led to different responses from the group of 'cohesion' countries. Ireland and Portugal stand out as the two extreme examples, as Ireland caught-up to the forerunners very rapidly after the launching of EMU, in 1992, whereas Portugal lost ground. This paper looks at structural shifts in order to explain the different performances of the two economies. We conclude that Portugal's labour productivity lag was the outcome of a less favourable structure of employment; that differences in the structure of employment are not clustered in specific industries; and that such structural differences are associated with different factor endowments, namely physical and human capital.

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Keywords: Economic growth; structural change; European integration; Ireland; Portugal.

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INTRODUCTION

Irish economic growth stands out as peculiar within recent European experience. In fact, Ireland went from being one of the poorest countries on the western part of the Continent in 1950 to one of the wealthiest by the end of the twentieth century. In 1962 Ireland took a decisive step towards opening up its economy, with the free trade agreement with the UK, and in 1973 Ireland joined the EEC and became a large receiver of financial transfers from Brussels. Yet, the change of tariff policy and structural funds did not impact directly on the growth rate of the Irish economy. Instead, twenty years later, Ireland took greater advantage of the intensification of the integration process led by the institution of the Economic and Monetary Union (EMU) and the creation of the single market in 1992 and the Euro in 1999.

The growth experience of the Portuguese economy differs markedly from that of Ireland. Following its accession to European Free Trade Association as a founding member, in 1959, Portugal also became increasingly more open to the external world and that was accompanied by high rates of economic growth and catching-up to the European core. After the first oil shock in 1973 and the political revolution that followed during 1974-75 the trend towards increasing openness was reversed. Soon after, in 1986, Portugal joined the EEC, in 1992 ratified the Maastricht treaty and in 1999 joined the European single currency. Portugal also became a large recipient of cohesion funds, which weighted considerably in total investment in social overhead capital and education. Yet despite the increasing levels of political and monetary integration and despite cohesion funds, Portugal caught up with a

much lower degree of intensity during the period since accession, comparing to what happened in the decades before 1973.

The different experiences of the two countries studied in this paper are associated with differences in many factors, which include, demographic growth and the performance of the labour market, the level of education, the share of FDI in manufacturing and service industries, the tax regime for foreign profit earnings, and the weight of ICT producing and using industries in total output. But how much did these factors matter? And why was Irish catching-up delayed?[1] What was the impact of the integration in the European communities for Ireland and Portugal?

The paper is structured as follows. Part I, provides the background scenario of the development of the two economies since 1960. We also discuss in that section the effects of European integration on the structure of the two economies. Part II looks at structural changes in Ireland and Portugal. We present there a shift-share analysis of output growth in order to conclude whether labour productivity expanded as the outcome of the growth of dynamic sectors or of traditional sectors. We also give a measure of changes in the structure of the two economies according to the size of ICT using or producing industries and according to the size of industries that benefit from increasing returns to scale. The papers ends with a concluding section.

I. THE TORTOISE AND THE HARE

Ireland and Portugal, together with Spain and Greece, form the group of 'cohesion' countries within the European Union. That definition was established with the enlargement of the EEC to southern Europe, in 1981 and 1986, and was born out of the consideration that the integration into the Communities of the peripheral countries would imply measures to take

[1] Cassidy (2004).

into account differentials in development levels. The stakes were high, in the 1980s, as were the perspectives that the convergence of European productivity and income per capita levels would advance rapidly. Yet, Portugal and to a certain extent Greece and Spain did not fulfil totally to the expectations, whereas the Irish economy had a very positive performance, particularly in the 1990s.

The main trends of GPD per capita growth in the four countries during the period from 1960 are shown in Table 1. In the period from 1960 to 1973, the three southern countries depict very high growth rates of income per capita, at rates close to 7 percent per year, whereas Irish growth, although historically high, remained behind, at 3.7 percent.[2] In 1973-1980, Ireland was the fastest growing economy, and in 1980-1990 its growth rate was close to that of Portugal. After 1990, Irish economic growth took off reaching 5.8 percent per year, and surpassed by a great margin that of the other countries, whereas Portugal lagged behind, growing at under 2 percent per year. Table 2 shows relative income levels. There we may see that Ireland had a better position, in 1960, as compared to the average of the European Union 14 members (Luxembourg excluded) and that it changed little down to 1980, to increase rapidly after 1990. Spanish relative position increased rapidly in 1960-1973 and again after 1980. Contrarily, Portugal and Greece were the two poorest countries in 1960 and they leaped forward in the decade to 1973, to change very little afterwards. Table 3 provides the rates at which the four economies caught-up or diverged to the European Union 14 average.[3]

[TABLES 1 to 3 ABOUT HERE]

[2] For Ireland we also use below GNP instead of GDP, due to overpricing of foreign owned firms which had an increasing large share of output. See Birnie and Hitchens (1996). See also O'Leary (1997) and Barry (2003).

[3] The lag of the southern economies and the Ireland towards the rest of Western Europe dates since at least the nineteenth century, and little catching-up occurred until World War II. See Lains (2003). See also Freitas (2000) and Barry (2003).

[FIGURES 1 AND 2 ABOUT HERE]

Table 4 shows the contribution of changes in labour productivity, employment rate and labour supply to the growth of income per head in the four countries, in three periods since 1974. The most important feature shown in the table is the fact that the rapid expansion of income per head in Ireland in the periods from 1987-2000 and 1994-2000 was due to the increase in the employment rate and labour supply. In fact, in 1994-2000, Irish income per head expanded at 7.1 percent per year and that was due to an increase in labour productivity of 3.1 percent, and increase in the employment rate of 1.8 percent and of labour supply of 2.4 percent. Portugal's increase in labour productivity was smaller but not by a large margin, at 2.3 percent in the same period. The main difference between these two countries was in the expansion of labour and employment. Barry (2000a) argues that Ireland acted as an economic region of a larger economy, namely the United States and one of the effects of that is that changes in the Irish economic cycle were closely followed by factor movements to and from the United States.[4] Changes in Irish labour were due to the net flow of immigrants which increased labour supply and average labour participation rates. The impact of net immigration was also felt in the quality of the Irish labour market, as their levels of education and training were above the average of the Irish resident labour force. By contrast, in Portugal, the employment rate changed very little since 1994 as did labour supply, because immigration, although expanding, was relatively small in numbers.[5]

[TABLE 4 ABOUT HERE]

Despite the fact that the gap in terms of labour productivity growth was smaller than the gap in terms of growth in income per capita, we still need to explain why Ireland's

[4] Contrarily, during the 1970s and the 1980s, Ireland was a 'regional' economy of the UK and that would explain, according to Barry (2000a), Irish slower growth in that period.

[5] See Honohan and Walsh (2002).

productivity expanded slower than Portugal's, before 1986, and why the comparative performance of the two countries was reversed in the years since.

Historical trends since 1960

Why did not Ireland take more advantage of its first stages of higher levels of integration in the European economy and why did she speed up growth much later on? In 1958, a new phase of economic policy started in Ireland with the creation of the Industrial Development Authority, which provided grants to promote domestic and foreign investment. This was the start of an 'industrialization-by-invitation strategy'.[6] During the 1960s the size of the Irish government increased significantly, but that was to a large extent the consequence of a significant increase in transfer payments, including social security, welfare, health and education. The share of the state in total investment remained small, around 5 percent of total gross capital formation throughout the decade.[7] The 1958 statute, however, was only a timid step towards liberalization of commercial links. In 1962, Ireland and the United Kingdom signed a free trade agreement that opened up the borders between the two countries.[8] Yet, the Irish economy changed little since demise of autarky in 1958. In 1973, at the eve of accession to the EEC, it was still highly protected and unable to explore markets abroad.

The EEC led to the definitive blow to Irish long standing protectionist policies. In fact, four years after joining the communities, Ireland abolished all its tariffs with the other member states. Ireland also joined the European Monetary System in 1979, contrarily to the UK, which implied leaving the pound sterling area. The immediate implications of openness

[6] Gotthreil (2003).

[7] See Gotthreil (2003), p. 727.

[8] The 1962 trade agreement followed the creation of EFTA, in 1959, by the UK and other six countries, including Portugal, and the French veto for UK accession, in 1961. The EFTA was geared mainly to industrial trade and Ireland was mainly an exporter of agricultural goods.

were considerable. Because of tariff removals, according to one account, 44 percent of firms closed, 88 percent of which in the textile sector, 50 percent in chemicals and metal products. In 1986, employment in 'traditional' sectors fell 76 percent of its 1980 level (72.6 percent in 1992).[9] Such 'destruction' proved however to be 'creative', as shown by the development of the manufacturing sector in the years that followed to the present times. Those changes were facilitated by a series of favourable factors that worked in the same direction. According to Gotthheil (2003), the first factor was the financial assistance from the European Communities, under the form of structural funds, which peaked at 3 percent of GNP in 1993, and were directed to infrastructural investments that were necessary for the ulterior development of the new industrial sectors. More importantly, FDI expanded very fast in the 1980s and 1990s and in particular investment from multinationals.[10] The Industrial Development Authority had an important role and it backed investment in industries that were considered more important to growth in the new open economy, namely, electronics, computer and pharmaceutical industries, and which administered a 'generous industrial grant system'. Thus, foreign funds which were attracted by helped by an appropriate institutional framework favourable to multinationals and the work of IDA eased the pressure on the balance of payments and on the state budget and allowed for heavy investment in infrastructures. Capital imports together with the existence of comparative advantages in industries with high levels of factor productivity and expanding international demand, accounted for the rapid response of the Irish manufacturing sector.

The data on Irish FDI is in fact impressive. In 1973, foreign firms employed 32.3 percent of total labour force, of which 7.3 percent were US and 14.6 percent of the UK. In 1994, foreign firms employed 44 percent of labour force, of which 23.2 percent from the US

[9] See Barry (1996), pp. 727-8.

[10] In 1981, the tax on foreign earnings profits was raised from zero to 10 percent, still well below most western European countries. See Honohan and Walsh (2002), p. 3.

and just 5.8 percent from the UK. Irish European integration led to the growth of her Atlantic links. But such changes in the structure of firm ownership occurred before the big spurt in Irish growth that took place essentially after 1994. Thus the explanation of the big spurt lays elsewhere. Rapid growth in the last decade was a consequence of the 'fruition of a cluster effect' derived from investment by multinational firms in computers, pharmaceutical and chemical industries. This interpretation points to a delayed effect of FDI from the US. But why did US firms choose Ireland? According to the same author, profits were substantially higher in Ireland, where they could be close or higher than 30 percent, whereas in the US the same firms profit rates average 5 percent.[11]

Portugal's post-war experience was different in many aspects. The opening up to the European markets took off in 1959 with the accession to EFTA, created in that year behind the leadership of the UK and in reaction to the creation of the EEC, two years previously. The EFTA led to a substantial change in the structure of Portuguese exports which followed the slow change that had been occurring in the manufacturing sector. But, during these early stages, industrial change was led by a 'traditional' sector, namely textiles. Moreover, the Portuguese government got a special treatment from its more industrialized EFTA partners (the UK, Denmark, Norway, Sweden, Switzerland and Austria) and it could continue to protect its industrial sector, under the understanding that many industries were starting. This special regime allowed the support of the State to industries that were considered relevant for the development of the economy and they included fundamentally capital intensive industries, such as cement, chemicals, metallurgy and metal works. Rapid growth and structural change came to a halt in 1973, following the first oil shock. The 1974 revolution that would lead to a democratic regime in 1976 gave a further blow in the system that led to such favourable

[11] Gotthreil (2003). Rates of profit can be highly inflated by manipulation of internal pricing my multinationals, in order to take full advantage of the low corporate profit tax in Ireland. See Honohan and Walsh (2002).

results. A decade of political instability, high inflation, increasing unemployment, distressed public finances and external imbalances ensued. Moreover the expansion of the foreign sector, which had jumped from 20 percent to 35 percent of GDP during the decade that followed the EFTA accession, stalled and the economy became increasingly protected by tariffs and other forms of State intervention.[12]

When Portugal joined the EEC in 1986 its manufacturing sector was already markedly different from the situation in 1973. In the years following accession, the Portuguese economy reached high rates of growth and that was due to the expansion of exports, as well the effect of investments in infrastructures which, like Ireland, were partially financed by European structural funds. At the same time, the economy went under structural transformation with the sharp decline of employment in the primary sector, once again made possible by European sources of finance through the Common Agriculture Policy. In these early years investment in education and thus in human capital increased more rapidly then before and for the first time human capital had a higher contribution than physical capital in the aggregate production function. Contrarily to Ireland at a later period, the resumption of growth was not led by the manufacturing sector, as the service sector also expanded rapidly.[13] Moreover, as we shall see below, there were no relevant changes in the structure of manufacturing towards new and more productive industries of the kind we find in Irish growth in the 1990s.

The effects of the Single European Market

European integration was deepened by the institution of the Economic and Monetary Union that led to the Single European Market (SEM), in 1992, and the Euro, in 1999, which led to the intensification of flows of trade and capital. The impact of the growth of trade and

[12] See Lains and Silva (2005), Vol. 3.

[13] See Lains (2003).

capital flows in the member states of the Union and the extent and direction of the impacts depended on various factors, among which we may include relative levels of economic development, institutional arrangements such as tax levels, and structures of economic activity and comparative advantage.

According to Barry (1996) the traditional neo-classical view posits that 'free trade and greater infrastructural development in peripheral regions will hasten convergence', but that has not always been confirmed empirically. In fact, he argues that 'one can reject the notion of absolute convergence as applying to regions or economies that differ substantially from each other in important respects, even though they might have strong trading links'. He ads that it is more important to disentangle 'the structural transformations of the economy wrought by free trade from the influences exerted by technological and global developments and the major swings in fiscal policy of the last two decades.'[14]

A similar type of conclusion is given by Krugman and Venables (1990 and 1996), according to whom 'the net effect of the sectoral gains and losses resulting from trade liberalization could be negative for peripheral economies.' They argue that if trade is primarily based on comparative advantages at the inter-industry level, the widening of the market leads most likely to the reinforcement of the established patterns of comparative advantage and thus to higher levels of specialization and regional concentration. Contrarily, if trade is based on intra-industry specialization, the effect of the wider market is uncertain and it may lead to wider specialization across regions. Moreover, the reduction of barriers to trade

[14] See also ESRI (1997), where it is argued that 'the process underlying the development of the small open economies of the EU periphery might be quite different from those underlying the development of the 'core' EU economies, on which the 1988 Cecchini analysis had been based.' For the analysis of the effects of European integration since the creation of EEC and EFTA, see also Henrekson et al. (1997). They conclude that membership impacted positively on growth and that it did not matter whether the country adhered to the EEC or EFTA.

in the case that industries are characterized by increasing returns of scale leads to the increase of the size of average firms, but firms can expand either by increasing their geographical concentration or by expanding their locations. Midelfart et al. (2003) argue in the same lines. According to them, the EMU led to an increase in trade among European Union member countries and that the trade increase led to higher geographical specialization, as 'firms relocate to benefit from comparative advantage and clustering'. They also conclude that such changes had a positive impact in overall EU economic growth.

Despite all the fears, the impact of higher levels of integration within the European Union was beneficial to the Irish economy because it led to the expansion of industries with higher productivity levels. That is concluded by Barry et al. (2001), who look at the impact of the Single European Market on the restructuring of the manufacturing sector and on the growth of demand for Irish produce abroad.

A more general perspective is given by Davies et al. (2001) who conclude that EMU did not affect considerably the pattern of geographical specialization across the Union. In their survey of studies on the impact of the Single European Market, they conclude that 'prior to 1992, it was argued that the SEM would systematically change the nature of competition, and therefore the structure of industries and firms. This was expected to result from the market-widening effect of removing the remaining non-tariff barriers, which would lead to greater realization of scale economies and, perhaps, a toughening in the competitive regime in industrial markets.' Moreover, industries where product differentiation through advertising and research and development was more important would thus tend to show higher levels of increasing returns to scale and thus the widening of the European market would lead to higher degrees of concentration, both at the aggregate level and within each country. In order to gauge the impact of the SEM in the industrial structure, Davies et al. (2001) test the effect of changes in trade, foreign direct investment and mergers and acquisitions on four 'structural dimensions' of firms, namely: concentration, diversification, multinationality and

geographical agglomeration. They use two matrices for European industrial structures at the national level for 1987 and 1993. Their main conclusions are, firstly, that concentration levels remained stable, as the largest 100 firms accounted for about 30 percent of total manufacturing output in both 1987 and 1993. Secondly, the activity of multinationals expanded across Europe in the same period, as the share of turnover of the 100 firms produced outside the home country increased from 30 to 37 percent. Thirdly, there was a limited increase in the core business of the same firms, which implies a small decline of product diversification. Fourthly, there was no general increase in geographical concentration of firms.

II. STRUCTURAL CHANGE

In order to measure the impact of increasing degree of openness in the Irish and Portuguese economies we need to analyse the changes in their structures. The structures of the economies of Ireland and Portugal since 1979 can be compared by using data compiled by the Groningen Growth and Development Centre.[15] Figure 3 compares the distribution of employment for the two countries, in 1979 and 2002. We can see that, in 1979, both Ireland and Portugal still had a large share of labour employed in the primary sector, which strongly declined in the years to 2002, although the transformation was more important in Portugal than in Ireland. In fact, Portugal's primary sector declined from 23.0 to 10.8 percent, from 1979 to 2002, whereas in Ireland the same decline was fro 18.1 to 6.8 percent. We can also observe a decline in 'Food, drink and tobacco' and that in 2002 the two countries had similar shares. There was also decline in 'Textiles, leather, footwear and clothing', but Portugal's employment remained more concentrated in these industries than Ireland, where they virtually disappeared. As we move to the right hand side of Figure 3, we can observe more similarities

[15] See also the OECD STAN data base which in its latest version includes Ireland.

than differences. The most relevant difference is the higher level of labour force in Ireland in 'Electrical equipment and instruments', 'Communications' and 'Financial intermediation'. The size of 'Non-market services', which includes education, health and public administration, is again similar in the two countries (although, 'Public administration' was higher in Portugal, in 2002, whereas 'Education' was relatively similar in the two countries and 'Health' was higher in Ireland).

[FIGURE 3 ABOUT HERE]

Figure 4 depicts the evolution of relative levels of labour productivity for the two countries, in 1979 and 2002, measured in purchasing power parity equivalents. In 1979, Portugal's total labour productivity was 91.3 percent that of Ireland and in 2002 that ratio had declined to 57.9 percent.[16] The most important conclusion we can draw form that data is that there is no discernible pattern in the comparison of labour productivity levels. For example, Portugal had lower labour productivity in 'Agriculture', as well as in 'Scientific instruments', and 'Construction'. On the other hand, Portugal had higher levels of labour productivity in industries such as 'Motor vehicles', 'Electricity', 'Communications', and 'Financial intermediation'. Productivity differential are thus not clustered in industries that could be classified as modern or intensive in the use of ICT.

[FIGURE 4 ABOUT HERE]

Structural change and productivity growth: a shift-share analysis

To estimate the contribution of structural change to productivity growth we use now a shift-share analysis that breaks down the growth of aggregate productivity into the following components: intra-industry effect, static effect and dynamic effect. The intra-industry effect

[16] We use in this comparison the PPP exchange rates implicit in total GDP. It should be taken into account, thought, that Irish GDP is inflated by over than 10 percent, due to overpricing of multinationals (see above).

refers to changes of productivity within each sector. The static component refers to circumstances in which resources shift towards sectors with productivity *levels* above the average. The dynamic component refers to circumstances in which resources shift to sectors with productivity *growth rates* above the average. This is known as the Verdoon effect or the 'structural bonus', which associates increases in labour productivity and output through the effects of increasing specialisation (Verdoon 1949).[17]

I consider here the modified shift-share analysis developed by Timmer and Szirmai (2000) to take into account the dynamic Verdoon effect. This analysis takes labour productivity (LP_t) or output per person employed (Y_t / L_t) as the product of sectorial labour productivity levels and the share of labour in each sector (S):

$$LP_t = Y_t / L_t = \sum_{i=1}^{n} Y_{(t,i)} L_{(t,i)} / L_{(t,i)} L_t = \sum_{i=1}^{n} L_{(t,i)} S_{(t,i)}$$

The change in labour can be computed as:

$$LP_t - LP_0 = \sum_{i=1}^{n} (LP_{(t,i)} - LP_{(0,i)}) S_{(0,i)} + \sum_{i=1}^{n} (S_{(t,i)} - S_{(0,i)}) LP_{(0,i)} + \sum_{i=1}^{n} (S_{(t,i)} - S_{(0,i)}) (LP_{(t,i)} - LP_{(0,i)})$$

(1) (2) (3)

The first term is the change in labour productivity attributed to intra-branch productivity growth, the second term is the static effect of structural change on productivity growth, and the third term is the dynamic effect. The analysis is carried out for three periods since 1979, presented in Table 5.

[17] The shift-share analysis here used has several limitations, including the fact that it measures average instead of marginal productivity and that it only takes into account the labour input. Similar calculations for Portugal are presented in Lains (2004)

By far, the major factor behind labour productivity growth in Ireland since 1979 is the effect of productivity changes within each industry. In 1979-86 the intra-industry effect accounted for 71.2 percent of change, it increased to 98.5 percent in 1986-94 and then declined to 71.1 percent in 1994-2002. The static effect which measures the change in the share of industries with above average labour productivity *levels* accounted for 37.2 percent of the change in 1979-86, and that effect declined significantly in the two following periods. Instead, the dynamic effect, that is the growth of the share of industries with productivity *growth* above average, started as negative and increased substantially to account for 26.9 percent of total labour productivity growth in the last period in the table, from 1994 to 2002. Portugal's performance was markedly different, as the dynamic effect was negative in both 1986-1994 and 1994-2002, and impacted negatively in labour productivity growth by -53.5 percent in the first period and -39.1 percent in the second period. In other words, in Portugal labour was leaving the industries, in both manufacturing and services, with above average productivity growth, contrasting to what was happening contemporarily in Ireland.

[TABLE 5 ABOUT HERE]

The Irish structural bonus

In order to explain why Ireland managed to benefit from such a structural bonus whereas Portugal did not, we need to see what industries contributed to the labour productivity upsurge. The literature points to two different types of conclusions which have quite different implications in terms of our perception of the reasons behind the Irish catching-up of the last 15 years or so and, consequently, about the prospects of backward economies to catch-up in the context increasing European Union integration. According to Cassidy (2004), the 'Irish pick-up in growth [in the 1990s] was primarily driven by the performance of a small number of foreign dominated high-technology sectors; productivity growth in the more traditional manufacturing sector and the services sector was more

modest'. Barros (2002) reached a different conclusion, stating that, 'according to our analysis, traditional industries have been at least as important as ICT-producing industries for the convergence process within the European Union'.

We now revert to estimating the contribution of ICT producing and using sectors to the growth of labour productivity. Table 6 provides the distribution of labour force according to the ICT taxonomy given by O'Mahony and Van Ark (2003) and there we may see some differences between Ireland and Portugal (see also Figure 5). In fact, the share of ICT producing and using industries in the manufacturing and the service sectors in Ireland totalled 25.4 percent of labour force in 1979 and 33.5 percent in 2002. In Portugal that share was slightly below Ireland's in 1979, at 22.1 percent and remained so in 2002 at 25.4 percent. Table 7 shows the contribution of each sector to total labour productivity growth and we may see that ICT using and producing industries accounted for 42.3 percent of labour productivity growth in Ireland in 1994-2002, whereas in Portugal they accounted for just 25.9 percent in the same period. Table 7 also shows that Ireland outperformed Portugal particularly in the ICT producing manufacturing industries, the contribution of which to labour productivity growth expanded from 9.8 percent in 1979-1986 to 15.8 percent in 1994-2002, whereas in Portugal that contribution was just 1.4 percent in the later period.

[TABLES 6, 7 and 8 ABOUT HERE]

[FIGURE 5 ABOUT HERE]

The data on the composition of labour force and the contribution to labour productivity growth according to the ICT taxonomy does lead to the conclusion that Ireland's better performance was due to those sectors in which information and communication technologies were more important. Yet, that data also shows that Portugal did not fare particularly badly in that respect. In fact, we may see that the ICT using manufactures contributed in a similar way in the two countries in 1994-2002; and similar contributions can be found in the ICT using services. Moreover, the data on Tables 6 and 7 also show that what

was happening in the remaining sectors was of paramount importance. In fact as much as 57.7 percent of labour productivity growth was due to non-ICT sectors in Ireland, the figure for Portugal being of course much higher, at 74.1 percent.[18] Table 8 gives a further classification of the manufacturing sector, according to the shares of 'favoured' sectors and increasing returns to scale (IRS) sectors, following the definition by Barry et al. (2001).[19] We may see there that Irish structural change was geared to those sectors more intensively than Portugal, as they accounted for about 40 percent of labour force in 2002, whereas in Portugal the similar share is 17.3 percent for the former and 25.2 percent for the later.

The relevance of the structural bonus

Irish and Portuguese labour productivity differed because of the joint effect of lower levels of productivity in certain industrial branches and also because of differences in the structures of the two economies. In order to measure the impact of these two factors, we may compare two counterfactual situations. The first is one where we take the structure of the Portuguese economy and the levels of Irish labour productivity; the second situation is one where we take Irish structure and Portuguese levels of productivity. Table 9 shows actual

[18] Barros (2002) also finds that the relation between speed of convergence and ICT-intensity is not significant for the cohesion countries during 1971-1992. Sánchez and Duarte (2005) also find that the contribution to structural change and productivity growth in Spain during 1980-1994 derived from a varied range of industries, including 'high technology' industries (i.e. computers, electrical, electronic and optical goods), 'medium-high technology' industries (chemical, machinery and automobiles), 'high-qualification' services (communications, banking, education and health) and other services (commerce, transport and public administration).

[19] 'Favoured' sectors were defined for the Irish economy only. We use the same definition for Portugal and it is only indicative. The definition of IRS sectors is nor country-specific.

aggregate labour productivity levels in the two countries and the two counterfactuals. In 2002, Irish total labour productivity was 1.725 times that of Portugal. Counterfactual A measures the situation in which we take the structure of Portuguese labour employment and the levels of Irish productivity and that implies a difference towards Portugal's actual level of a factor of just 1.425. On the other hand, if we consider a counterfactual where we take Irish employment structure and Portuguese labour productivity levels, the difference is 1.751. This exercise shows that the main cause of the productivity differential of the two countries is the differences in the structure of employment and not differences in labour productivity levels.[20]

[TABLE 9 ABOUT HERE]

Differences in the structure of employment in the two economies can be explained in terms of supply constrains and in particular in terms of endowments of physical and human capital in the two countries. Table 10 shows relative levels of physical and human capital per worker in the two countries in 1980 and 2000. Three relevant conclusions can be drawn from the figures there. The first one is that the levels of both forms of capital were higher in Ireland. The second is that the difference in endowments has declined rapidly in terms of physical capital, from a ration of 2.24 in 1980 to a ratio of 1.47 in 2000, and less so in terms of human capital, namely, from 1.36 to 1.25 in the same time span. The third relevant conclusion is that the deficit for Portugal in terms of physical capital is *higher* than the one in terms of human capital.

[TABLE 10 ABOUT HERE]

[20] This analysis does not take into account the interaction between structure and labour productivity levels.

CONCLUSION

The structure of the Irish and Portuguese economies changed dramatically in the period from 1979 to 2002, but that changed occurred in quite different ways. In both countries, there was a reduction in the share of the labour force employed in traditional sectors, which was compensated by an increase in the shares of modern sectors. But that transformation was quicker in Ireland than in it was in Portugal. The impact of such structural change on the growth of labour productivity was quantified in this paper: as much as 29% of Ireland's labour productivity growth between 1994 and 2002 was due to increasing numbers of people engaged in industries where productivity was increasing rapidly. By contrast, changes in the structure of the Portuguese economy had a *negative* impact on the growth of the country's labour productivity, which accounted for minus 39% of labour productivity growth.

Moreover, the shares of ICT-producing and ICT-using industries in the manufacturing and the service sectors expanded faster in Ireland, increasing from 25.4 to 33.5 percent, from 1979 to 2002, whereas in Portugal that share barely changed, in the same period, from 22.1 to 25.4 percent. ICT related industries accounted for 42.3 percent of labour productivity growth in Ireland in 1994-2002 and just 25.9 percent in Portugal, in the same period. In manufacturing, Ireland also had a 'structural' advantage, as about 40 percent of labour force was employed in 'favoured' or increasing returns to scale (IRS) sectors, in 2002, whereas the same shares in Portugal amounted to only 17.3 percent ('favoured' sectors) and 25.2 (IRS sectors).

Why did changes in the economic structures of the two economies have such different effects? The answer lies in the structure of the comparative advantages of the two countries: at the start of the period, Portugal had comparative advantages in sectors with lower levels of labour (and thus presumably capital) productivity. The abandonment of tariff protection and the adoption of the euro implied a higher degree of exposure to international market forces

and thus to increases in the output of those lower productivity industries. By contrast, Ireland had comparative advantages in higher labour productivity industries and thus benefited from the higher level of participation in the international economy. The main reason for the better structure found throughout in the Irish economy is related to the fact that its endowments in physical and human capital were higher, as compared to Portugal.

There are some relevant policy implications that we can derive from our conclusions. According to Esteban (2000), if countries (or regions) that lag behind suffer from a 'uniform productivity gap', then one should back 'present EU regional policies based on structural funds essentially geared to improve infrastructures and human capital', and not specific policies geared to promote ICT-producing industries. Policies directed towards infrastructures and education would help bridge Portugal's lags in physical and human capital endowments. But one shouldn't be too optimistic. The kind of policies mentioned above was implemented after Portugal's accession to the European Communities, in 1986, under the designation of structural funds. The changes in the structure of the Portuguese economy that we observed in this paper were to an unknown extent related to the structural funds transfers. Yet the changes observed in Portugal were much less impressive than what we could observe in Ireland, particularly after the early 1990s. That does not come as a surprise - foreign direct investment and export growth are certainly more powerful sources of structural change and productivity growth than inter-governmental transfers within the European Union. The fact that those two sources of growth may be interrelated implies that financial transfers within the European Union would benefit the most the receiving countries if they lead to more private international capital flows and that may depend on the design of such policies.

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Table 1 – Growth of real GDP per capita in the Cohesion Countries, Europe and the USA, 1960-2004
(annual growth rates, percent)

	1960-1973	1973-1980	1980-1990	1990-2004
Greece	6.75	2.58	1.23	2.43
Ireland	3.70	3.19	3.07	5.83
Portugal	6.64	2.24	3.13	1.83
Spain	6.96	2.62	2.74	2.58
EU-14	4.18	2.19	2.02	2.03
USA	2.88	1.95	2.09	1.96

EU-14: Luxembourg excluded.
Source: Computed from Groningen Growth and Development Centre, Total Economy Database, August 2005, at http://www.ggdc.net

Table 2 – GDP per capita in the Cohesion Countries, PPP (EU14 = 100)

	1960	1973	1980	1990	2004
Greece	54.2	76.9	77.7	70.9	76.1
Ireland	67.0	62.6	67.2	76.1	124.9
Portugal	45.7	63.5	62.5	68.8	67.4
Spain	50.7	73.7	76.4	81.9	88.3

Source: See Table 1

Table 3 – Convergence of real GDP per capita in the Cohesion Countries, 1958-1990
(annual growth rates, percent)

	1960-1973	1973-1980	1980-1990	1990-2004
Greece	2.72	0.16	-0.92	0.51
Ireland	-0.52	1.02	1.26	3.60
Portugal	2.58	-0.24	0.98	-0.15
Spain	2.92	0.52	0.70	0.54

Note: un-conditional beta-convergence defined as:

$$\phi = [(y_i / y15)_{(t+n)} / (y_i / y15)_{(t)}]^{[1/n]}$$

where y_i is income per capita for each of the 4 cohesion countries and y15 is the average for EU-15.
Source: See Table 1.

Table 4 – Components of GDP pc growth, PPP (Ireland, GNP pc)

	Income per head	Labor productivity	Employment rate	Labor supply
1974-1986				
Greece	0.8	0.8	-0.4	0.4
Ireland	1.6	2.7	-0.9	-0.2
Portugal	1.1	3.0	-0.5	-1.4
Spain	1.2	3.1	-1.4	-0.5
EU-15	1.7	2.0	-0.6	0.3
1987-2000				
Greece	1.7	1.5	-0.4	0.6
Ireland	5.6	3.0	1.0	1.5
Portugal	3.6	2.6	0.4	0.6
Spain	3.0	1.2	0.5	1.3
EU-15	1.8	1.7	0.1	-0.1
1994-2000				
Greece	2.8	2.2	-0.4	0.9
Ireland	7.1	2.9	1.8	2.4
Portugal	3.1	2.3	0.2	0.5
Spain	3.1	1.1	1.2	0.8
EU-15	2.4	1.6	0.4	0.4

Sources: Barry (2003), pp. 904 and 908-9.

Table 5 – Shift-share analysis of labour productivity growth, 1979-2002 (percent)

	Ireland			Portugal		
	1979-1986	**1986-1994**	**1994-2002**	**1979-1986**	**1986-1994**	**1994-2002**
Total change	100	100	100	100	100	100
Intra-industry effect	71.2	98.5	71.1	65.2	65.1	139.3
Static effect	37.2	7.8	2.0	36.3	88.4	-0.3
Dynamic effect	-8.5	-6.3	26.9	-1.6	-53.5	-39.1

Sources: See text. Computed from Groningen Growth and Development Centre, 60-Industry Database, February 2005, at http://www.ggdc.net

Table 6 – Distribution of labour force according to ICT Taxonomy, 1979-2002 (percent)

	Ireland	Portugal

	1979	1986	1994	2002	1979	1986	1994	2002
ICT Producing Manufacturing	1.1	1.5	2.4	3.2	0.8	0.8	0.6	0.6
ICT Using Manufacturing	6.2	6.3	6.1	4.6	6.8	6.8	7.2	5.7
ICT Producing Services	3.6	3.6	2.7	4.4	1.0	1.1	1.0	1.2
ICT Using Services	14.5	17.7	19.0	21.3	13.5	14.4	16.7	17.9
Non-ICT Manufacturing	14.0	11.9	10.6	8.5	16.9	16.4	13.9	11.2
Non-ICT Services	31.0	34.7	39.0	39.6	27.1	32.0	38.8	41.1
Non-ICT Other	29.6	24.3	20.2	18.5	34.0	28.5	21.9	22.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.00	100.0

Note: ICT taxonomy definition according to O'Mahony and Van Ark (EC; 2003), p. 49.
ICTPM: office machinery; insulated wire electronic valves and tubes; telecommunication equipment; radio and television receivers; scientific instruments.
ICTPS: communications; computer and related activities.
ICTUM: clothing; printing and publishing; mechanical engineering; other electrical machinery and apparatus; other instruments; building and repairing of shipping and boats; aircraft and spacecraft; railroad equipment and transport equipment; furniture; miscellaneous manufacturing; recycling.
ICTUS: wholesale trade and commission trade; except of motor vehicles and motorcycles; retail trade except of motor vehicles and motorcycles; repair of personal household goods; financial intermediation; except insurance and pension funding; insurance and pension funding; except compulsory social security; activities auxiliary to financial intermediation; renting of machinery and equipment; research and development; legal, technical and advertising.
NICTM: food, drink and tobacco; textiles; leather and footwear; wood and products of wood and cork; pulp, paper and paper products; mineral oil refining, coke and nuclear fuel; chemicals; rubber and plastics; non-metallic mineral products; basic metals; fabricated metal products; motor vehicles.
NICTS: sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel; hotels and catering; inland transport; water transport; air transport; supporting an auxiliary transport activities; activities of travel agents; real estate activities; other business activities; public administration and defence; compulsory social security; education; health and social work; other community, social and personal services; private households with employed persons; extra-territorial organizations and bodies.
NICTO: agriculture; forestry; fishing; mining and quarrying; electricity, gas and water supply; construction.

Source: Computed from Groningen Growth and Development Centre, 60-Industry Database, February 2005, http://www.ggdc.net

Table 7 – Contribution to labour productivity growth according to ICT Taxonomy, 1979-2002 (percent)

	Ireland			Portugal		
	1979-86	1986-94	1994-02	1979-86	1986-94	1994-02
ICT Producing Manufacturing	9.8	3.4	15.8	0.6	2.0	1.4
ICT Using Manufacturing	7.1	6.3	8.4	6.5	6.2	8.5
ICT Producing Services	2.9	3.6	2.0	1.3	2.3	1.3
ICT Using Services	10.1	14.3	16.1	11.6	12.2	14.7
Non-ICT Manufacturing	20.1	12.8	11.1	16.4	15.2	16.7
Non-ICT Services	26.4	32.3	30.2	24.3	26.9	35.6
Non-ICT Other	23.5	27.3	16.5	39.3	35.1	21.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

Notes and sources: see Table 6.

Table 8 – Labour force in "Favoured" and Increasing Returns to Scale Sectors (thousands and percent)

		Ireland				Portugal			
Thousands	ISIC 3	1979	1986	1994	2002	1979	1986	1994	2002
Food, drink & tobacco	15-16	62	54	51	57	186	168	154	143
Textiles	17	16	11	9	6	206	180	127	97
Clothing	18	17	16	13	4	142	148	168	132
Leather and footwear	19	6	2	1	1	56	68	76	55
Wood & products and cork	20	5	4	5	7	68	58	55	55
Pulp & paper products *	21	6	5	5	6	17	15	14	11
Printing & publishing	22	13	12	17	24	29	28	36	33
Mineral oil refining, coke	23	0	1	1	1	3	3	3	2
Chemicals # *	24	13	14	20	27	42	40	30	26
Rubber & plastics # *	25	7	8	10	11	25	23	23	26
Non-metallic mineral prod *	26	15	13	11	12	66	55	59	56
Basic metals *	27	4	3	3	3	17	15	13	11
Fabricated metal products	28	14	10	12	16	59	53	52	55
Mechanical engineering # *	29	12	13	15	16	31	27	24	26
Office machinery # *	30	5	7	12	22	1	5	1	0
Insulated wire # *	313	1	1	2	2	5	5	6	8
Other electrical machiny # *	31-313	6	8	10	12	19	19	23	26
Electronic valves and tubes	321	1	2	4	11	10	9	7	6
Telecommunication equip #	322	1	1	3	4	2	2	2	6
Radio and TV receivers #	323	0	0	1	1	11	9	7	6
Scientific instruments #	331	4	5	8	16	5	4	4	5
Other instruments	33-331	3	4	4	6	2	2	2	2
Motor vehicles # *	34	8	4	4	5	17	15	18	21
Building & rep of ships *	351	2	1	1	1	28	17	7	4
Aircraft and spacecraft # *	353	0	0	0	0	1	1	2	1
Railroad & transp equip *	352+359	4	5	4	6	3	2	5	3
Furniture, misc., recycling	36-37	11	10	11	13	50	45	57	58
Part B – "Favoured" Sectors (#)									
Total Manufacturing		239	212	235	288	1.104	1.016	975	874
Total Favoured Sectors		58	60	84	117	160	150	140	151
FAV / Total Manuf (percent)		24.2	28.5	36.0	40.5	14.5	14.8	14.3	17.3
Part C – IRS Sectors (*)									
Total Manufacturing		239	212	235	288	1.104	1.016	975	874
Total IRS		84	79	95	122	273	239	224	220
IRS / Total Manuf (percent)		35.1	37.2	40.6	42.3	24.7	23.5	23.0	25.2

Source: Groningen Growth and Development Centre, 60-Industry Database, February 2005, at http://www.ggdc.net. Definition of sectors according to Barry (2003).

Table 9 – Actual and counterfactual total labour productivity (2002 US$, PPP adjusted)

	1979	1986	1994	2002
Portugal actual	19,080	24,002	29,140	31,472
Ireland actual	20,910	26,066	34,596	54,299
Counterfactual A	21,515	24,632	32,329	44,838
Counterfactual B	23,733	30,699	32,887	55,110
RATIOS				
Ireland actual / Portugal actual	1.096	1.086	1.187	1.725
Counterfactual A / Portugal actual	1.128	1.026	1.109	1.425
Counterfactual B / Portugal actual	1.244	1.279	1.129	1.751

Notes: Values adjusted according to the implicit PPP deflator of GDP for Portugal and GNP for Ireland.
Counterfactual A: taking the structure of the Portuguese labour employment and the levels of Irish labour productivity.
Counterfactual B: taking the structure of Irish labour employment and the levels of Portuguese labour productivity, adjusted by the PPP exchange rate.
Memo:
(1) Total labour productivity (Portugal/Ireland): 1979 - 0,520; 1986 - 0,509; 1994 - 0,462; 2002 - 0,340;
(2) GDP (Portugal/Ireland): 1979 - 0,913; 1986 - 0,921; 1994 - 0,842; 2002 - 0,580;
(3) PPP coefficient (2)/(1): 1979 - 1,754; 1986 - 1,810; 1994 - 1,824; 2002 - 1,704.
Sources: See Table 6.

Table 10 – Levels of capital per worker in Ireland and Portugal, 1979-2002
(USA = 1; and ratios)

	Physical capital		Human capital	
	1980	**2000**	**1980**	**2000**
Ireland	0.83	0.94	0.80	0.85
Portugal	0.37	0.64	0.59	0.68
Ratio Ireland /Portugal	2.24	1.47	1.36	1.25

Source: Freitas (2005), p. 116

Figure 1 - GDP per capita in Europe and the US, 1950-2004 (US$, 2002 prices)

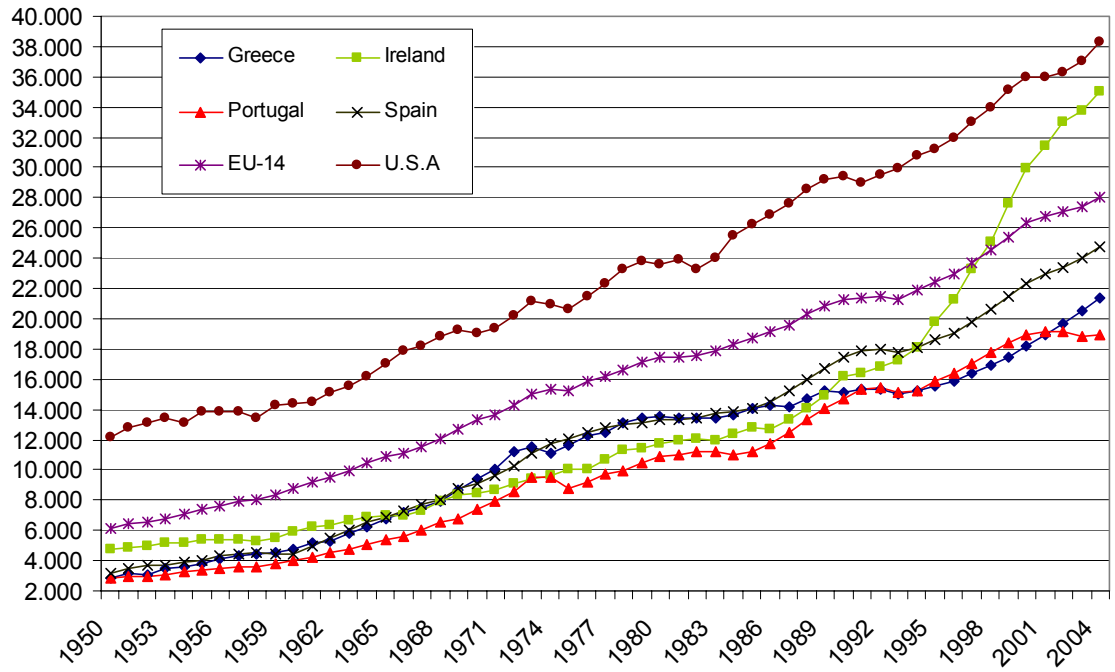
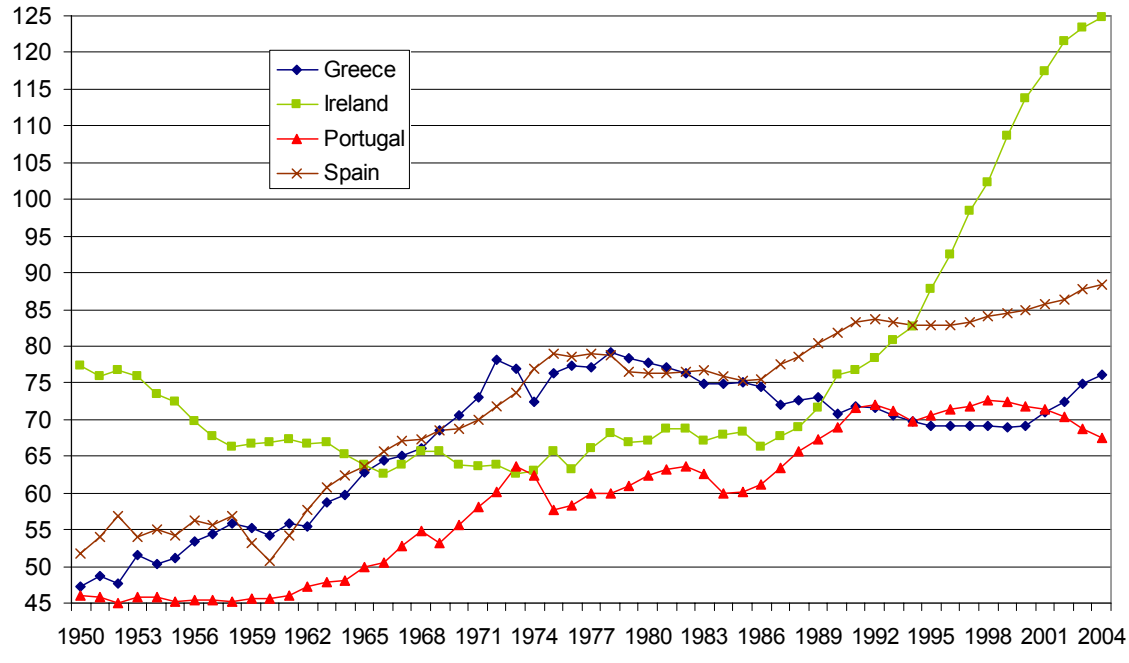
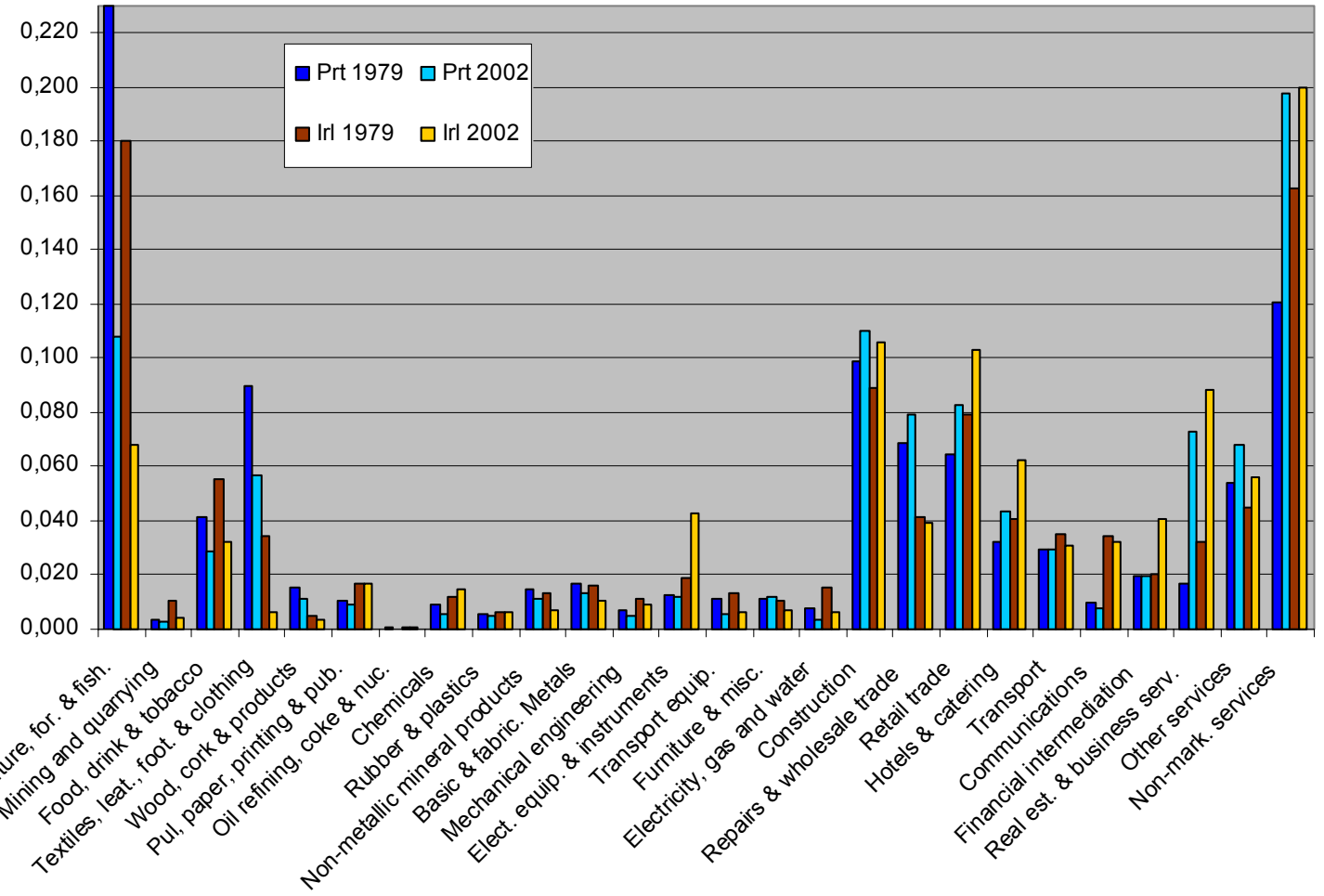


Figure 2 - GDP per capita as % of EU-14, 1950-2004 (2002 prices)

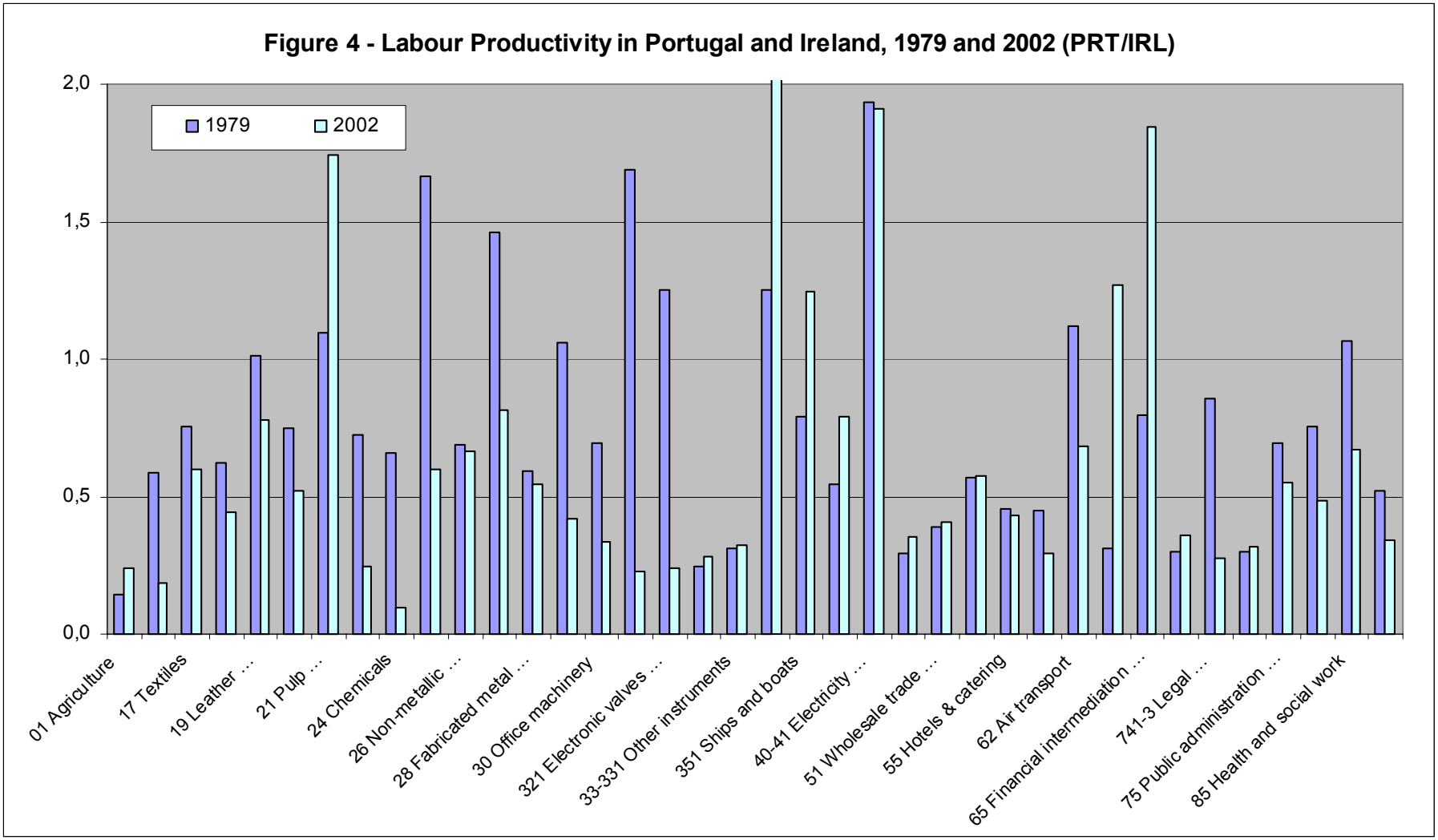


Source: Computed from Groningen Growth and Development Centre, Total Economy Database, August 2005

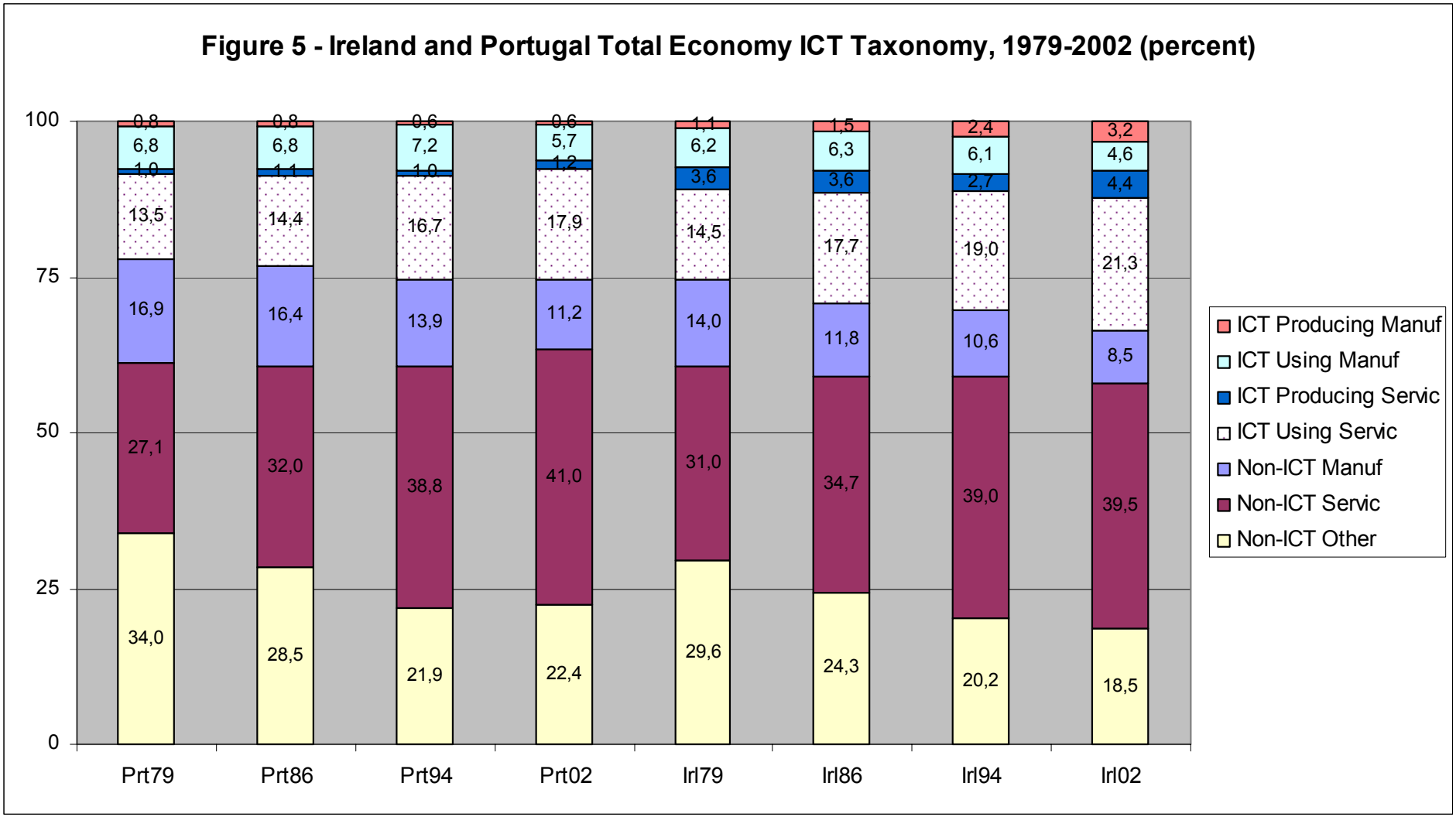
Figure 3 - The structure of employment in Ireland and Portugal, 1979 and 2002 (percent)



Source: Computed from Groningen Growth and Development Centre, Total Economy Database, August 2005



Note: Key to the figure in the Appendix table below.
Source: Computed from Groningen Growth and Development Centre, Total Economy Database, August 2005



Source: Computed from Groningen Growth and Development Centre, Total Economy Database, August 2005

Appendix table – Key to Figure 4: labour productivity per person engaged (in chained 1995 Euros, PPP adjusted). Portugal / Ireland

	1979	2002
01 Agriculture	0,255	0,409
15-16 Food, drink & tobacco	1,033	0,321
17 Textiles	1,322	1,025
18 Clothing	1,088	0,759
19 Leather and footwear	1,772	1,331
20 Wood & products of wood and cork	1,316	0,890
21 Pulp, paper & paper products	1,927	2,972
22 Printing & publishing	1,269	0,419
24 Chemicals	1,151	0,161
25 Rubber & plastics	2,922	1,023
26 Non-metallic mineral products	1,210	1,132
27 Basic metals	2,567	1,384
28 Fabricated metal products	1,035	0,931
29 Mechanical engineering	1,857	0,717
30 Office machinery	1,215	0,569
31-313 Other electrical machinery	2,959	0,388
321 Electronic valves and tubes	2,199	0,406
331Scientific instruments	0,432	0,485
33-331 Other instruments	0,542	0,551
34 Motor vehicles	2,195	4,529
351 Building and repairing of ships	1,385	2,125
352+359 Railroad equipment	0,955	1,343
40-41 Electricity, gas and water supply	3,388	3,258
45 Construction	0,511	0,601
51 Wholesale trade	0,682	0,695
52 Retail trade	1,003	0,979
55 Hotels & catering	0,800	0,730
60 Inland transport	0,792	0,498
62 Air transport	1,962	1,162
64 Communications	0,547	2,163
65 Financial intermediation, except insurance and pension funding	1,401	3,141
72 Computer and related activities	0,522	0,610
741-3 Legal, technical and advertising	1,501	0,473
749 Other business activities, nec	0,523	0,539
75 Public administration and defence; compulsory social security	1,216	0,943
80 Education	1,321	0,822
85 Health and social work	1,875	1,144
TOTAL ALL INDUSTRIES	0,913	0,579

Source: See Figure 4.